MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2 2017/2018

TLD7011 – LOW LEVEL DESIGN OF SOFTWARE

(All sections / Groups)

29 JANUARY 2018
8.00 p.m – 10.00 p.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 5 pages only, exclusive of the cover.

2. Attempt **ALL FOUR** questions . All questions carry equal marks and the distribution of the marks for each question is given .

3. Please print all your answers in the Answer Booklet provided.

YOU MUST ANSWER EVERY QUESTION. EACH QUESTION CARRIES THE SAME DISTRIBUTION OF MARKS.

QUESTION 1

(a) Figure 1 shows a task dependency graph. Assuming that each task requires 1 unit of time, calculate the following metrics with workings.

[4 MARKS]

I. Maximum degree of concurrency
II. Critical path length
III. Total amount of work
IV. Average degree of concurrency

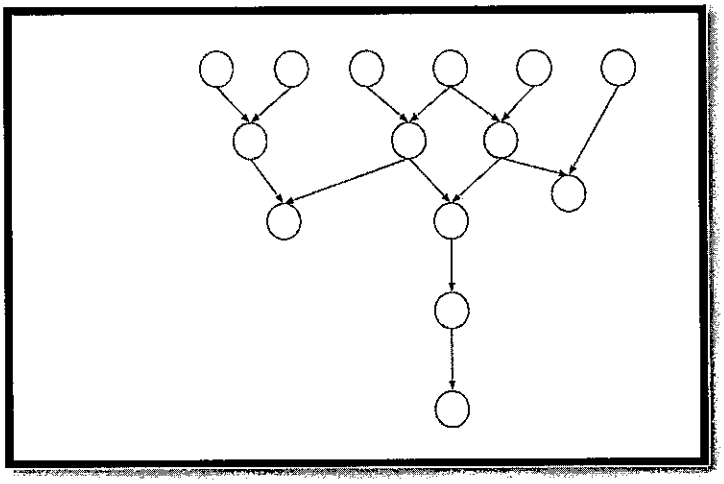

Fig. 1 Task Dependency Diagram

(b) Figure 2 shows the process of counting the number of instances of a given item-sets in a database of transactions. The output as shown in Figure 2, would be the item-set frequencies. Draw a single diagram that demonstrates how both input AND output data decomposition is performed in this scenario. **[3 MARKS]**

Continued...

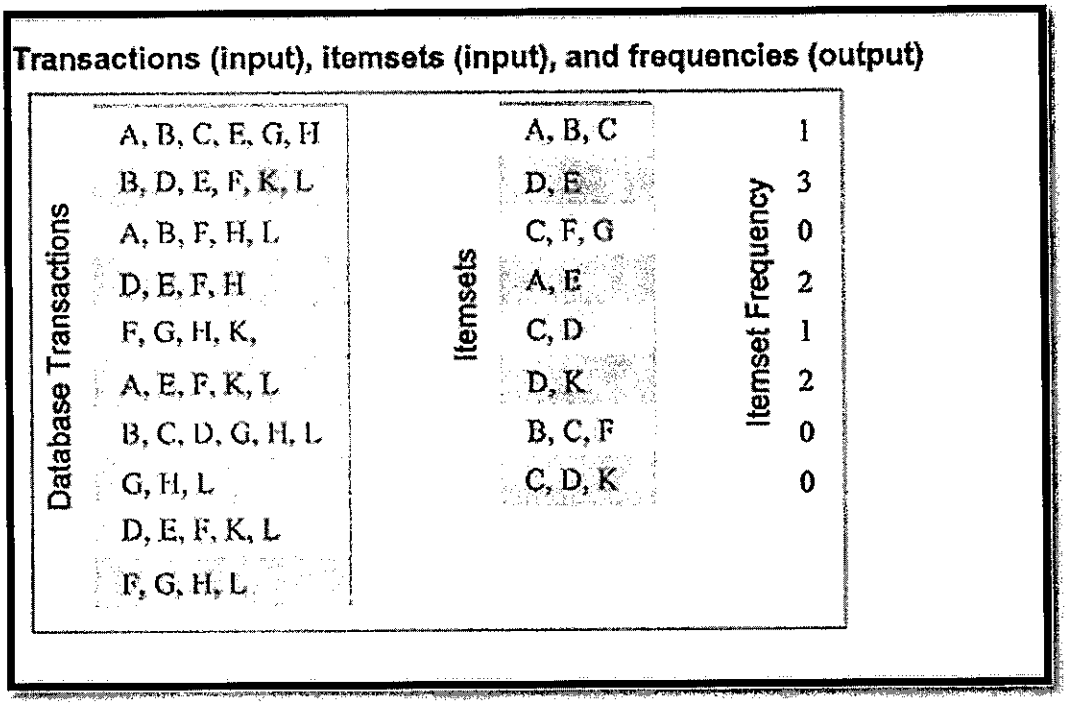

Fig. 2 Transaction, item-sets and frequencies of a given database

(c) Consider the task interaction diagram in Figure 3. Calculate the computation-to-communication ratio for Node 0 as well as the combination of nodes 0,4 and 8 as a single task (as shown by the ellipse in the task interaction diagram). You can assume that each node and each edge takes 1 time unit. Which decomposition is better?

[3 MARKS]

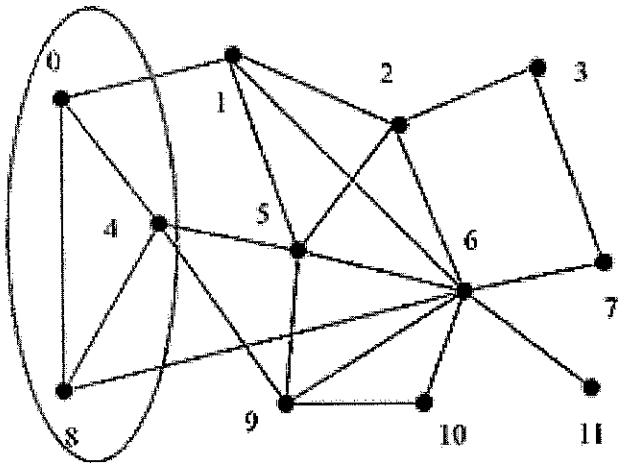

Fig.3: Task interaction diagram

Continued...

QUESTION 2

(a) Consider the following snippet of code. We want to be able to **construct** an object representing a person knowing:

1. only his/her age,
2. or only his/her age and weight,
3. or only his/her age, weight and height,
4. or only his/her age, weight, height and id
5. or only his/her age, weight, height, id and name

Identify one shortcoming of this design, and subsequently identify a suitable software design pattern which can be used to improve the design of the code, and give a reason why this software design pattern improves the design.

[3 MARKS]

```
public class Person {
        private int age;
        private int weigth;
        private int height;
        private int id;
        private String name;

        //////////////Here comes the telescopic constructors
        public Person() {
                //some stuff
        }

        public Person(int age) {
                this();//we're using the previous constructor
                this.age = age;
        }

        public Person(int age, int weigth) {
                this(age);//we're using the previous constructor
                this.weigth = weigth;
        }

        public Person(int age, int weigth, int height) {
                this(age, weigth);//we're using the previous
constructor
                this.height= height;
        }

        public Person(int age, int weigth, int height,int id) {
                this(age, weigth, height);//we're using the
previous constructor
                this.id = id;
        }

        public Person(int age, int weigth, int height,int
id,String name) {
                this(age, weigth, height, id);//we're using the
previous constructor
                this.name = name;
        }

}
```

Continued...

(b) Draw the generic class diagram for the design pattern which you have identified in Question 2(a) **[3 MARKS]**

(c) Write out the code (pseudo code acceptable in lieu of actual code) that implements the design pattern that you have identified. **[4 MARKS]**

QUESTION 3

(a) Describe, in your own words the general flow of activities that is to be done when you do refactoring. **[4 MARKS]**

(b) For each of the following codes, re-factor using the given method, pseudocode is acceptable. State the motivation to use the particular refactoring technique, and any special considerations that needs to be addressed.

[6 MARKS]

I. Encapsulate Field

```
1: public class MyClass
2: {
3:     public string LastName;
4:     public string FirstName;
5:     public int Age;
6: }
```

II. Extract Hierarchy

```
 1: public class Dog
 2: {
 3:     public void EatFood()
 4:     {
 5:         // eat some food
 6:     }
 7:
 8:     public void Groom()
 9:     {
10:         // perform grooming
11:     }
12: }
```

Continued...

III. Extract Method

```
 1: public class Receipt
 2: {
 3:     private IList<decimal> Discounts { get; set; }
 4:     private IList<decimal> ItemTotals { get; set; }
 5:
 6:     public decimal CalculateGrandTotal()
 7:     {
 8:         decimal subTotal = 0m;
 9:         foreach (decimal itemTotal in ItemTotals)
10:             subTotal += itemTotal;
11:
12:         if (Discounts.Count > 0)
13:         {
14:             foreach (decimal discount in Discounts)
15:                 subTotal -= discount;
16:         }
17:
18:         decimal tax = subTotal * 0.065m;
19:
20:         subTotal += tax;
21:
22:         return subTotal;
23:     }
24: }
```

QUESTION 4

Jack and Jill works as a team when they are developing a software solution. Jill is the junior developer so she codes, while Jack observes. Jack's role is to point out mistakes and to plan ahead. Subsequently, their work will be presented together during a software design review. In the review, Jack and Jill play the role of the author.

(a) State 4 benefits of Jack and Jill's way of working. **[4 MARKS]**

(b) Name any 3 methods of software design review **[3 MARKS]**

(c) Explain the advantages of using the agile methodology as compared to using a traditional waterfall development methodology. **[3 MARKS]**

END of Paper